

100. Kotahi rau.
 101. Kotahi rau ma tahi (one hundred and one).
 102. " ma rua (" two).
 110. " kotahi tekau (one hundred, one ten).
 111. " ma tahi (one hundred, one ten, and one).
 115. " ma rima.
 120. " e rua tekau.
 121. " ma tahi.
 199. " e iwa tekau ma iwa.
 200. E rua rau.
 201. " ma tahi.
 202. " ma rua.
 250. " e rima tekau.
 300. E toru rau.
 400. E wha rau.
 500. E rima rau.
 1000. Kotahi mano.
 1001. " ma tahi.
 1100. " kotahi rau.
 1101. " ma tahi.
 1102. " ma rua.
 1906. " e iwa rau ma ono.
 2000. E rua mano.
 3000. E toru mano.
 10000. Kotahi tekau mano.
 100000. Kotahi rau mano.

ART. XVI.—*Two New Species of Leech in New Zealand.*

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Plates VIII and VIIIa.

Up to the present time two species of leech have been described from this region—the first by Dendy and Olliver in 1900, and three years later I added a second species. Since that date I have been trying to obtain leeches—which undoubtedly occur in our streams in various parts of the Island—but with only limited success. In the present communication I give an account of the anatomy, internal and external, of two new species, and add a short description of the internal anatomy of *Hirudo antipodum*. The four leeches now known to occur in New Zealand are here systematically arranged.

Order RHYNCHOBDELLIDA.

Fam. GLOSSOSIPHONIDÆ.

MICROBDELLA, Moore, 1900.

M. novæ-zealandiæ, Dendy and Olliver.

PLACOBDELLA, Blanchard, 1893.

P. maorica, n. sp.

Order ARHYNCHOBDELLIDA.

Fam. HIRUDINIDÆ.

HIRUDO, Linné, 1758.

H. antipodum, Benham.*H. mauiana*, n. sp.*Placobdella maorica*, n. sp.

A single specimen of this small aquatic leech was forwarded to me by Professor Chilton, who had received it from Mr. T. Horan, of Ruapuke Island, in Foveaux Strait. It was preserved in alcohol, and was a good deal contracted.

Shape and Dimensions.—The form is oval, much arched dorsally, concave ventrally. The head was curved downwards. The posterior end was also bent downwards, so that the hinder sucker was hidden when the animal was viewed from above. The lateral margins were similarly inflexed, rounded (fig. 1).

The total length measured along the curved dorsum was 9 mm.; the transverse diameter, 4 mm.; the widest part being about the middle of the body. The posterior sucker measured 1.75 mm. across, and the margins inflexed. Probably in life the animal would be about an inch in length.

Colour and External Features.—The colour is a uniform pale-greyish brown in spirit, without any trace of pattern or coloured spots, but under a dissecting-lens one or more rows of minute brown dots were visible in each annulus. Certain of the annuli (see below) carry four papillæ, regularly arranged so as to form four longitudinal rows along the dorsal surface.

As for the "segmental sensillæ," on which Whitman (16, 19) laid so great a stress in his valuable work on the land-leeches of Japan, and which have since been utilised for the purpose of plotting out the segments, I was unable to recognise any definite organs. Oka (14) and Castle (8) have also found a difficulty in applying this method to some members of the family Glossosiphonidæ.

There is a single pair of eyes on the 3rd annulus. They are not quite symmetrical, as that on the left side is slightly more anteriorly placed than the right eye. Possibly this ocular annulus is double; but in the following enumeration of somites and annuli I have refrained from a too detailed analysis, as it is extremely difficult on a preserved and strongly contracted specimen, especially when only a single individual is at hand, to be certain of the difference between annuli and "wrinklings," even in longitudinal sections. Consequently I neglect the apparently double nature of certain annuli, and

regard each as single. In front of the eyes are two annuli, both of which are strongly bent so as to be V-shaped in this individual. The ocular annulus is thus the 3rd; the 4th shows indications, especially laterally, of being double; the 5th is the first complete one, and forms the posterior margin of the anterior sucker: this also presents an indication of being double.

There appear to be 70 annuli—possibly 71 or even 72; but the posterior region is so much contracted that I did not find it possible to distinguish annuli certainly from the wrinklins on the base of the sucker.

The anus is on the 69th annulus.

The papillæ above referred to are on annuli 6, 9, 12 &c., 63, 68, 69, and I believe on 70 and 71, which are at base of the sucker and form its dorsal surface here. There are, thus, normally three annuli to a somite. In the greater part of these annuli there are four papillæ—a pair dorsally and a pair dorso-laterally placed. They are nearly equidistant from each other, but the space between the dorso-lateral and the margin of the leech is about half that separating the dorsal from the dorso-lateral (figs. 2, 3). Owing to the great contraction of the two extremities I was unable to detect the outer papillæ on annuli 6, 9, or 68, 69.

Turning now to the ventral surface, the anterior sucker is bounded posteriorly by the 5th annulus. The mouth lies rather low down on the anterior lip, and was only recognisable in sections. The true form of this anterior sucker is concealed by the contraction of the leech, the upper lip being curved downwards so as to reduce the opening to a narrow crescentic slit.

The male pore is a rounded prominence (? due to contraction) between the 25th and 26th annuli (*i.e.*, 21st and 22nd post-oral). The female pore, detected only in sections, lies two annuli behind—*i.e.*, between the 27th and 28th.

Following Castle (8), who finds in the Glossosiphonids, examined by him with great care, that the anterior sucker is always contained in the somite iv, we have the male pore between somites xi and xii, while the female pore is between annuli *b* and *c* of somite xii. It is the presence of these two annuli between the pores that is used as one of the characters of *Placobdella* by Blanchard (4, 6).

Internal Anatomy

The internal anatomy was studied by means of longitudinal sections.

The Alimentary Tract (fig. 4).—The mouth is small, situated

far down on the anterior lip of the sucker, in front of the eyes, and probably in the 2nd annulus. It leads into the usual pharyngeal sac, which extends backwards into about somite ix. In it lies the long, muscular, club-shaped pharynx, which was somewhat displaced laterally, and undulating. It commences as a very narrow tube just behind the brain, but increases considerably in diameter as it passes backwards, so that in somite x it is four or five times its previous diameter. Opening into the posterior end is a pair of groups of salivary glands, each group consisting of a bunch of numerous large gland-cells, each of which is prolonged into a long narrow neck, as described by Castle for several species. The bunch of cells is, however, more compact than in the species described by him, each bunch being confined to a single segment—to the eleventh. The short œsophagus leads into the crop, which is produced laterally into seven pairs of cæca in somites xiii to xix, the first and last of which are larger than the rest. The first, arising in somite xiii, passes forwards into somite xi; it is sacculated, overlies the ductus ejaculatorius, and is indented by its coils. The last similarly passes through about four segments, and is also sacculated. Each of the others is confined to its own segment.

A feature that I do not see noted in the description of other members of the family is a median gland surrounding the crop in somite xi; it consists of cells similar to the pharyngeal-gland cells, closely wrapped round the tube.

The stomach, occupying somites xxi to xxiv, is produced into four pairs of simple pouches, each enveloped as usual by a great dilatation of the dorsal blood-vessel. These gastric pouches are not strictly metameric: they are much crowded in the specimen, and lie partly over one another. They appear to belong to somites xxi, xxii, xxiii, xxiv.

The intestine follows, and passes to the dorsally situated anus.

The *nephridia* were not traced out fully, nor was the total number enumerated; the funnels have a form typical for Glossosiphonids.

The Generative Organs (fig. 5).—There are six pairs of testes (really testicular sacs), lying immediately behind the six anterior enteric cæca, and partially below them (probably due to curvature and the contracted condition of the individual); they lie in the annuli 31, 34 &c., to 46—i.e., in the posterior annulus of somites xiii to xviii. They are compressed by the neighbouring organs, but are more globular towards the margins of the body. They contain only a few sperm-morulae, as the spermatozoa had already been discharged into the seminal vesicles.

The six testes on each side are connected by short vasa efferentia with a dorsally situated vas deferens, which runs forwards into segment xiii and then bends backwards along the floor of the body in a very undulating course, to somite xvi; here each vas deferens opens into the seminal vesicle of its side.

The vasa efferentia open by ciliated funnels into the testes through the anterior wall, except in the last, where the funnel perforates the posterior wall.

The seminal vesicle may be regarded essentially as a cylindrical sac, but as it passes forwards it is much constricted and folded by the enteric cæca and by the vertical muscles, so that in reality its outline is very complex. It commences in somite xvi and passes forwards into somite xii, where it communicates with the narrow, muscular-walled ductus ejaculatorius. This is cylindrical, a good deal coiled in somite xi, and opens mesially into a pyriform or subspherical glandular sac, which may be termed "the spermatophoral sac"; it is transversely placed and opens with its fellow into a shallow, broad, common atrium, which in its turn communicates with the exterior between somites xi and xii.

Whitman (19) has described and figured the spermatophores of *Placobdella parasitica* (*Clepsine plana*), and discussed the question of the "hypodermic impregnation," giving an account of the structure of the different regions of the sperm-duct, with which account the present species closely agrees.

The ductus ejaculatorius, when it issues first from the seminal vesicle, is lined by a low epithelium; further along this becomes a layer of high glandular cells, which reduce the lumen of the tube.

In the "pyriform sac," in which Whitman believes the spermatophore is formed, the epithelium becomes still taller, and the lumen almost obliterated; the cells are much vacuolated in the specimen under consideration.

The seminal vesicle is distended with spermatozoa; the wall consists of a thin connective-tissue coat (staining blue in picronigrosin) lined with a low columnar, almost cubical, epithelium.

In segment xviii, on the left side of the body, situated just below the sixth enteric cæcum, is a mass of spermatozoa, not enclosed by any wall, but free in the body cavity: this mass is quite isolated from the seminal vesicle and from the testicular sac. It has, no doubt, arrived here by migration from the surface, as suggested by Whitman; and, in addition, I note a smaller mass dorsally above the gut.

The ovary (or ovarian sac) is a comparatively small lobulated sac, of short extent, occupying only two segments, xiii and xiv;

it has a thick wall, chiefly of connective tissue (staining blue in picronigrosin). In it is the usual coil of germ-cells, the true ovary or germarium. This "egg-cord" consists of very minute cells, only a few of which exhibit the characters of ova. I imagine, from this fact, and from the unusually short extent of the sac, that the ova have recently been discharged, and that when fully developed the sac would be longer.

The sac narrows to form a duct, which opens to the exterior in common with its fellow, at the hinder part of somite xii.

Hirudo mauiana, n. sp.

The opportunity of studying this, the second species of Gnathobdellid leeches to be recorded as occurring in New Zealand, I owe to Mr. H. Suter, who sent me nine specimens. They were obtained by Mr. Alfred Suter in water pumped up from a depth of 28 ft. in the grounds of the Farmers' Co-operative Freezing-works, at Penrose, Auckland. Probably, however, they are not truly subterranean, but live normally in some swampy region, or in ponds in the neighbourhood, and had been carried in some way into the well. The first individual to be obtained was thoughtfully sent to me alive, in October, 1905, and I was able to make a careful study of the coloration.

Colour.—The greater part of the dorsal surface is a dark olive-brown, paler and greener along the median line. This median band is bordered on each side by a linear streak of light yellowish-green. On each side the dark ground-colour is traversed by a well-defined band of light dusky-yellow, about midway between the median band and the margin of the body, which is reddish-orange. Except for the two admedian linear streaks and the marginal orange, there are thus seven nearly equal bands of colour—five dark and two yellow (fig. 6). The latter taper at each end, ceasing anteriorly at the level of the last pair of eyes, and posteriorly a few annuli in front of the sucker. The ventral surface is a uniform orange-red, which passes upwards round the margin on to the upper surface to form the marginal band just mentioned.

This individual was killed by adding alcohol gradually to the water, so that it retained its extended condition: it was then preserved in formol. When examined a year later the olive-brown had become a dark-grey, the admedian pale-greenish lines are now much paler—in fact, a dirty-white—and the conspicuous yellow bands are also dirty-white. The sucker is dark along the middle, but pale-yellowish along the right and left

sides. The remaining eight individuals preserved in alcohol exhibit the same pattern.*

It will be evident, then, that the colour pattern is quite different from that of *H. antipodum* (2), though we do not know with certainty what are the true colours of this leech when alive. But as there are differences of greater importance in the internal anatomy, the distinctness of the two species is considerable.

Dimensions.—The living leech when fully extended — *i.e.*, with both its suckers adhering to the table-top — measured 85 mm., and when contracted 25 mm., with a diameter of 7 mm. in the latter condition. The length when killed and preserved is now 70 mm.; the greatest breadth, which is a little behind the middle of the body, is 5 mm., but this is only slightly greater than the diameter elsewhere; and thickness 3 mm. The sucker, about 4·5 in diameter (fig. 7).

Of the remaining eight, the measurements are as follows (Nos. 2–5 were killed in alcohol, Nos. 6–9 in corrosive sublimate):—

Measurements in Millimetres.

No.		Length.	Breadth.	Sucker.
1	..	70	5	4 × 4·5
2	..	64	9	4·5 × 5·5
3	..	59	6	4·5 × 5·5
4	..	50	5·25	4 × 5
5	..	50	5	4 × 4
6	..	49	5·5	3·5 × 4
7	..	48	5	3·5 × 4
8	..	48	5	3·25 × 3·75
9	..	39	5	3 × 3·5

The sucker is not quite circular, having the transverse diameter slightly greater than the longitudinal.

It will be seen that the specimens vary from rather less than 2 in. to nearly 3 in. in a preserved state, with a breadth of approximately $\frac{1}{4}$ in. No. 2 on the list is distended, probably with blood.

The leech is long and narrow, with a moderate sucker.

External Anatomy.—This was studied in specimen No. 1 when freshly killed.

There are the usual five pairs of eyes, on the annuli charac-

* Four, killed in corrosive sublimate, show the olive-brown as dark-brown, the yellow bands as pale-primrose, the belly dirty-white. Four were killed in alcohol; in these the olive bands are now dark bluish-grey, the yellow bands are very pale yellowish-brown. In all the median band is paler than the two lateral dark bands.

teristic of the genus—viz., 1, 2, 3, 5, 8 (following Whitman and Blanchard, but Moore counts the preocular region as the first annulus. I have, however, made no attempt to analyse the annulation). The eyes are situated at the edge of the dark pigmented region.

I find no distinct preocular annulus, nor can I detect in any of the specimens, fresh or preserved, any segmental “sensillæ”—hence my inability to define the limits of the somites, which no doubt agree with other species.

The total number of annuli is 102. The male pore is situated on the extreme posterior margin of annulus 30, so that in a contracted specimen it appears to be between 30 and 31; the female pore is between annuli 35 and 36: or, counting the ventral annuli only, they lie respectively between the post-oral annuli 24 and 25, and 29 and 30—in other words, in a position typical for the genus.

The seventeen pairs of nephridiopores occupy the usual position.

The lower lip is formed by annuli 5 and 6, fused more or less; while the 4th also comes down the side of the sucker, and part of the way across the ventral surface, but is here indistinguishably united with the 5th.

Internal Anatomy.

This was examined only by means of dissection of other individuals; not of No. 1.

The alimentary canal has the usual structure. The anterior sucker leads to the mouth, and is grooved dorsally (fig. 8).

The three jaws are nearly semicircular; the oral margin being, however, rather straighter than the aboral or outer margin, which meets it at an angle. The denticles are set along this margin only, very small externally, and increasing gradually towards the angle; the second and third, at the oral end of the series, being of much greater size (fig. 9). There are forty-eight to fifty of these denticles.

In *H. medicinalis*, it may be mentioned, the denticles are set along the entire margin, and though gradually increasing in size as the median plane is approached, they are not so large as those in the present species, and are much more deeply imbedded in the jaw.

The *genital organs* (fig. 10) differ in several details from the typical species. There are, as usual, ten testicular sacs (or testes) on each side, communicating by short vasa efferentia with the delicate vas deferens running along the body-wall at their outer side. At its anterior end this duct becomes enlarged, and closely convoluted to form a whitish mass, the “epididymis”

(or seminal vesicle); when the duct leaves this it dilates to form a large ovoid muscular sac, from the anterior end of which a narrow duct passes transversely, to open into a median, globular, gland-covered "prostate," from the posterior end of which the long, curved, muscular "penis-sac" (cirrus-sac) passes backwards, then bends forwards ventrally to open to the exterior at the male pore, just behind the sixth ganglion.

The most striking point in which this species differs from *H. medicinalis* is the presence of the ovoid muscular sac, which no doubt corresponds to the comparatively narrow muscular "ductus ejaculatorius" of that species.

The female organs consist of the usual pair of small ovarian sacs, each of which communicates by a narrow oviduct with the anterior end of a large gland-covered sac (the albumen-gland), from the hinder end of which a comparatively wide "uterus" passes backwards, then curves forwards ventrally and becomes the "vagina," which opens by the female pore just behind the seventh ganglion. The "uterus" is readily distinguishable from the vagina by the different character of the wall, the latter having distinct circular muscles surrounding it.

In one specimen opened both the male and female duct lie on the right side of the nerve cord; in the second, the male is on the right and the female on the left side.

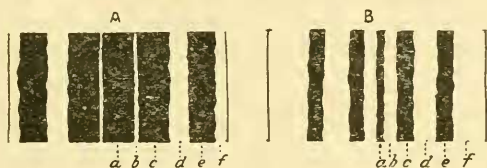
Remarks.—There is a superficial resemblance to a leech from New South Wales—*H. australis*, Besisto (3)—in which olive-brown and yellow bands alternate; but an examination of the coloured figures given by Becker (1) and by Schmarda (15) show essential differences in the arrangement of these bands.* In it the yellow predominates over the darker tint, which, according to Schmarda and Besisto, is nearly black in life. The median dark band is quite narrow, bordered on either side by a slightly broader yellow band: this is followed successively on each side by two dark separated by two light bands of approximately equal breadth, much greater than that of the median and admedian bands; but the outer dark band is narrower than either of the yellow bands.

It is true that coloration alone may be insufficient to distinguish two leeches, for a considerable range of variation is known to occur in *H. medicinalis*—the best-studied species of *Hirudo*; nevertheless, Grube states that all the specimens studied by him exhibit the same pattern; and all my New Zea-

* I have followed the synonymy given by Grube (10), who identifies *H. quinquestrata*, Schmarda, with *H. australis*, Besisto. Blanchard, however, refers to Schmarda's species as belonging to his genus *Linnobdella* (5, p. 29), and does not refer to Besisto's specific name.

land specimens agree with one another and in pattern, which differs from that of *H. australis*. It may be suggested that here we have two well-marked "local varieties" of one and the same species. Possibly this is the case; but if we turn to measurements we find that *H. australis* is a broader leech, and has a larger sucker.

The contrast with the present species is perhaps best rendered evident by a comparison of the two following diagrams:—



EXPLANATION OF TEXT FIGURES A AND B.

Colour pattern of (A) *Hirudo mauiana* and (B) *H. australis* (copied from Schmarda). In both the various bands are lettered—in A, *a* is olive-green; *b*, greenish-yellow; *c*, *e*, olive-brown; *d*, bright-yellow; *f*, reddish-orange: in B, *a*, *c*, *e* are very dark olive (nearly black); *b*, *c*, yellow; *f*, brownish-orange.

Grube gives the measurements of two individuals (presumably preserved), and Schmarda gives the dimensions of another (apparently living). Taking a medium-sized individual (Grube's) and comparing it with a specimen from New Zealand of corresponding length, we have,—

	Length.	Breadth.	Sucker.
	Mm.	Mm.	Mm.
<i>H. australis</i>	.. 72	16	10
<i>H. mauiana</i>	.. 70	5	4·5

Of internal structure we know nothing, excepting the jaws, of which Schmarda says that each jaw bears forty-eight to fifty denticles; and he shows them arranged along the entire margin, to increase in size towards one end, and to be of much greater size than in *H. mauiana*.

If Grube's synonymy be correct, I believe I am justified in creating a new species.

Hirudo antipodum, Benham.

My previous article (2) dealt only with such external features as seemed to be diagnostic of the species. I have now to give a brief account of the internal organs, as seen on dissection of a small specimen 25 mm. in length. The alimentary tract agrees in the main with *H. medicinalis*, though I was able to

detect only ten cæca, of which the anterior two are very small. The crop was partly filled with blood, the four posterior cæca being distended therewith; the three or four preceding cæca contained more or less blood, but there was none in the anterior cæca.

The pharynx appears to occupy a greater proportion of the body than usual; its hinder end reaches to a point at about one-third of the total length of the body, and covers both the median genital organs.*

I have already, in my previous note, called attention to the edentulous condition of the jaws.

The genital organs (figs. 11, 12) differ considerably from the typical species—and, indeed, from any other species of *Hirudo*, so far as I can ascertain. There are only seven testicular sacs on each side; the vas deferens is relatively wide as it passes along the series, but anteriorly, in front of the testicular sacs, it becomes narrow, then presents the usual convoluted region, forming an epididymis or seminal vesicle, whence a narrow muscular “ductus ejaculatorius” passes transversely to a median gland-covered muscular sac of nearly spherical form, which opens directly to the exterior by its ventral surface. There is no narrow “cirrus-sac” such as occurs in other species of *Hirudo*. The filiform cirrus (which is protruded in one specimen) is contained within this globular sac, which may be termed “atrium.” It corresponds to prostate + penis-sac.

The female organs are also different from the type. The ovarian sacs are conspicuously large—larger, indeed, than the “albumen gland,” alongside which they lie. The muscular vagina is a short U-shaped tube, which, as it approaches the body-wall below the gland, becomes greatly dilated, so that its diameter is nearly as great as that of the overlying gland.

Remarks.—It may be necessary to form a new genus for this species, but at present I have not sufficient literature at my disposal to allow me to do so with surety.

The only other leech, so far as I am aware, in which the number of testes is so small as seven pairs is *Philobdella*, Verrill—which, however, is possessed of characteristic and unique “copulatory glands,” opening on to pits which appear to serve as adhesive organs in copulation. Moreover, the genital pores are separated by less than one somite; the annulations of the body in *P. gracile*, Moore (12), at any rate, being more complex than in *Hirudo*. There are also other differences. In *Limnatis*, however, the number of testes is eight pairs, according to Moquin-

* In *H. medicinalis* the hinder end of the pharynx is at a point well in front of the genital organs, about one-seventh the total length, and in *H. mauriana* this point is at about one sixth the length.

Tandon; who, however, according to Blanchard, has confused *Limnatis nilotica* with *Hæmopsis sanguisuga*, and describes it under the latter name (*loc. cit.*, pl. vi).

In this leech the vas deferens is described as of large size and sinuous; the testes are also relatively large; the prostate + penis-sac is pyriform, as the penis-sac is very short and straight. In all these respects *H. antipodum* agrees with *Limnatis nilotica*, which has a very wide distribution over Asia, south Europe, and north Africa. But Blanchard (1894), in defining *Limnatis*, says, "Jaws with more than a hundred very acute denticles, and ornamented with papillæ; anterior lip with a ventral groove." In each of these points my species disagrees.

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EXPLANATION OF PLATES VIII AND VIII_A.*Placobdella maorica*.

- Fig. 1. Ventral view of a much-contracted specimen (much enlarged). The head is bent downwards and shows the eyes. A short distance behind the tip of head is the male pore.
- Fig. 2. Diagrammatic view (or analysis) of the dorsal surface of the anterior end. The annuli are numbered on the left and the somites on the right side.
- Fig. 3. Similar analysis of the hinder end of the body: *a*, anus; *s*, posterior sucker.
- Fig. 4. Diagram of the alimentary system, showing segmental positions of the parts (scale half that of figs. 2 and 3). Some of the somites are numbered. The outline of the anterior sucker is indicated by the broken line. *c*¹, *c*⁷, first and last cæca of the crop; *cg*, the enveloping gland of crop; *cr*, crop; *gl*, pharyngeal glands; *i*, intestine; *mo*, mouth; *ph*, pharynx in the pharyngeal sac; *st*, stomach; *t*¹, *t*⁶, the first and last testicular sacs, in true position.
- Fig. 5. Plan of the genital organs (on same scale as figs. 2 and 3): *at*, atrium; *d.ej.*, ductus ejaculatorius; *od*, oviduct; *ov*, ovary; *s*, spermatophoral sac; *s.v.*, seminal vesicle; *t*¹, *t*⁶, the first and last testicular sacs.

Hirudo mauriana.

- Fig. 6. Anterior end ($\times 4$), showing pattern and position of eyes.
- Fig. 7. Ventral view of entire leech ($\times 1$).
- Fig. 8. Ventral view of under-surface of the anterior end ($\times 7$). The lower lip has been slit through, and the cut edges turned aside. The sucker has been stretched lengthwise. *b.w.*, body-wall; *g*¹, first ventral ganglion exposed; *j*, jaw; *m*, muscles of jaw; *or*, anterior or oral sucker.
- Fig. 9. One of the jaws ($\times 40$, camera drawing).
- Fig. 10. The anterior portion of the genital organs ($\times 4\frac{1}{2}$). The median organs are represented as turned aside. *alb*, albumen gland; *ep*, epididymis; *g*⁶, the sixth ganglion of the ventral chain; *ms*, muscular (? spermatophoral) sac; *n.c.*, nerve-cord; *ov*, ovary; *p*, penis-sac; *pr*, prostate; *t*¹, first of the ten testicular sacs of the left side; *ut*, uterus; *v.d.*, vas deferens; *vg*, vagina.

H. antipodum.

- Fig. 11. The genital organs ($\times 4$): *alb*, albumen gland; *at*, atrium (=prostate + penis sac); *ep*, epididymis; *g*⁶, *g*⁸, the sixth and eighth ganglia; *n.c.*, nerve-cord; *ov*, ovary; *t*¹, *t*⁷, first and last testicular sacs; *v.d.*, vas deferens.
- Fig. 12. The median portion of the genital organs turned aside ($\times 8$): ♂ the atrium (penis-sac) penetrating body-wall to open externally; ♀, the vagina (*vg*) penetrating the body-wall to open externally. Other letters as before.